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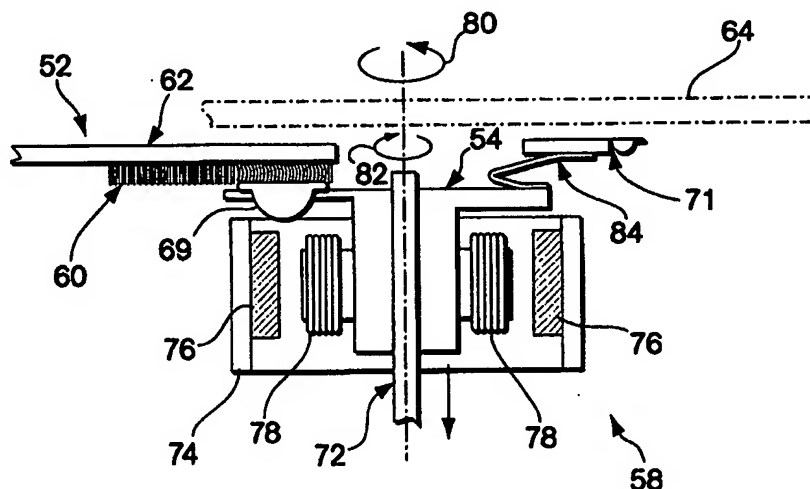
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : G11B 5/41, 7/12, 23/50, 21/12	A3	(11) International Publication Number: WO 98/53455 (43) International Publication Date: 26 November 1998 (26.11.98)
(21) International Application Number: PCT/US98/10342 (22) International Filing Date: 20 May 1998 (20.05.98) (30) Priority Data: 60/047,150 20 May 1997 (20.05.97) US (71) Applicant: DIGITAL PAPYRUS CORPORATION [US/US]; Suite 440, 2025 Gateway Place, San Jose, CA 95110 (US). (72) Inventors: LEE, Neville, K., S.; Honk Kong University of Science and Technology, Dept. of IEEM, Clear Water Bay, Kowloon, Honk Kong (CN). KATAO, Hisashi; 5940-2, Hino, Hino City, Tokyo 191 (JP). (74) Agent: ENGELSON, Gary, S.; Wolf, Greenfield & Sacks, P.C., 600 Atlantic Avenue, Boston, MA 02210 (US).		(81) Designated States: CN, JP, KR, SG, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> (88) Date of publication of the international search report: 25 February 1999 (25.02.99)

(54) Title: SYSTEM AND METHOD FOR CLEANING HEAD ASSEMBLIES AND DATA STORAGE DISKS**(57) Abstract**

A system and method effectively cleans head assemblies and data storage disks without damage. In one embodiment, the system includes a cleaning pad and a head disposed within a disk drive. An actuator is placed in communication with the head such that the actuator can produce two independent movements of the head. One of the independent movements may include reciprocal movement of the head while it is proximate the cleaning pad. Alternatively, or in addition to the reciprocal movement, the actuator may vary the amount of force exerted on the head by the cleaning pad. In an alternative embodiment, a

cleaning system for removing contaminants from a removable data storage disk includes a housing adapted to receive the disk and a cleaning pad rotatably mounted within the housing proximate the disk to remove the contaminants from the disk. The system further includes a pad-cleaning component in communication with the cleaning pad such that the contaminants are removed from the pad.



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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER IPC 6 G11B5/41 G11B7/12 G11B23/50 G11B21/12		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) IPC 6 G11B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 368 242 A (HITACHI LTD) 16 May 1990	1-3,7,8, 12,13, 15,17 4-6,9-11
A	see abstract; figures 1-5,8,9,13,15 see column 2, line 52 - column 3, line 20 see column 4, line 29 - column 5, line 6 see column 5, line 28 - line 33 see column 6, line 4 - line 9 ---	
X	PATENT ABSTRACTS OF JAPAN vol. 018, no. 394 (P-1775), 22 July 1994 - & JP 06 111351 A (TOSHIBA CORP), 22 April 1994 see abstract; figures 1-6 ---	12,13, 15,17
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 13 November 1998		Date of mailing of the international search report 16. 11. 98
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl Fax: (+31-70) 340-3016		Authorized officer Pariset, N

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 010, no. 284 (P-501), 26 September 1986 -& JP 61 104341 A (MITSUBISHI ELECTRIC CORP), 22 May 1986	1,2,12
A	see abstract; figures 1-5 ---	7,15
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 160 (P-1340), 20 April 1992 -& JP 04 010210 A (ASAHI OPTICAL CO LTD), 14 January 1992	1,12
A	see abstract; figures 1-5 ---	6
A	US 5 268 890 A (COLESCOTT WILLIS G) 7 December 1993 see abstract; figures 1-3,5 see column 2, line 28 - column 3, line 12 see column 3, line 20 - line 37 see column 4, line 7 - line 22 ---	1,2,6,12
A	US 5 615 196 A (KATO KAZUNARI) 25 March 1997 see abstract; figures 1-2B,9,8 see column 7, line 17 - line 35 see column 12, line 8 - column 13, line 63 ---	1,2,6,12
A	US 5 486 970 A (LEE NEVILLE K ET AL) 23 January 1996 cited in the application see abstract; figures 5-11 see column 3, line 3 - column 5, line 32 ---	1-17
X	US 5 467 332 A (TSURUSHIMA KATSUAKI) 14 November 1995 see abstract; figures 3,4 see column 4, line 18 - column 7, line 30 ---	18,19
X	US 4 241 368 A (KITAMOTO TATSUJI ET AL) 23 December 1980 see abstract; figure 3 see column 4, line 59 - column 5, line 22 ---	18,19
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A	US 5 228 022 A (COMPTON KENNETH C ET AL) 13 July 1993 see abstract; figures 1,4-9 see column 2, line 16 ---	18,19
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/10342

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 0 640 969 A (SHOYO SEIKI KK) 1 March 1995 see abstract; figures 1-6 see column 3, line 9 - column 9, line 40 -----</p>	18

INTERNATIONAL SEARCH REPORT

International application No.

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see continuation sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

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International Application No. PCT/ US 98/10342

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. claims 1-17:

Cleaning system/method for removing contaminants from a head comprising a head, a cleaning pad and a mechanism to control the movement of the head with respect to the cleaning pad.

2. claims 18-20:

Cleaning system for removing contaminants from a removable data storage disk comprising a housing adapted to receive the disk, a cleaning pad mounted within the housing for removing contaminants from the disk and a pad-cleaning component for removing contaminants from the cleaning pad.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 98/10342

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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